# ROTARY PULSE DETONATION SYSTEM WITH AERODYNAMIC DETONATION PASSAGES FOR USE IN A GAS TURBINE ENGINE

## ABSTRACT OF THE DISCLOSURE

A pulse detonation system for a gas turbine engine having a longitudinal centerline axis extending therethrough. The pulse detonation system includes a rotatable cylindrical member having a forward surface, an aft surface, and an outer circumferential surface, where at least one stage of circumferentially spaced detonation passages are disposed therethrough. Each detonation passage further includes: a leading portion positioned adjacent the forward surface of the cylindrical member, with the leading portion having a centerline therethrough oriented at a designated angle to an axis extending substantially parallel to the longitudinal centerline axis within a specified plane; a trailing portion positioned adjacent the aft surface of the cylindrical member, with the trailing portion having a centerline therethrough oriented at a designated angle to the axis within the specified plane; and, a middle portion connecting the leading and trailing portions, with the middle portion having a centerline therethrough with a substantially constantly changing slope in the specified plane. A shaft is rotatably connected to the cylindrical member and a stator is configured in spaced arrangement with the forward surface of the cylindrical member and a portion of the shaft. The stator further includes at least one group of ports formed therein alignable with the leading portions of the detonation passages as the cylindrical member rotates. In this way, detonation cycles are performed in the detonation passages so that combustion gases interact therewith to create a torque which causes the cylindrical member to rotate.